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**MIND
AT THE END
OF ITS TETHER**

BY

H. G. WELLS



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Preface

This little book brings to a conclusive end the series of essays, memoranda, pamphlets, through which the writer has experimented, challenged discussion, and assembled material bearing upon the fundamental nature of life and time. So far as fundamentals go, he has nothing more and never will have anything more to say.

The greater bulk of that research material may now go down the laboratory sink. It is either superseded or dismissed. It will go out of print and be heard of no more.

This applies particularly to a large assemblage of material published under the title of '42 to '44. This was gathered together in the course of five or six years and finally it was rushed into print; it was published at a prohibitive price, because, although the writer wanted to put certain things on record, he was acutely aware how very provisional his record still was. Now it can fall into oblivion. The quintessence is here in this small and reasonably priced volume, and the author may use some of the documentary material that figured in its predecessors and which in most cases was as sound as it is irrelevant to our fundamental theme, as a source-book for critical writing in whatever remnant of

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time still remains for him. It is factually quite sound and much will be available for a study of the *Decline and Fall of Monarchy and Competitive Imperialisms* should the writer last out to write that.

'42 to '44 was thrown together rather hastily because of an ill-advised medical judgment upon his prospect of living. Among the complications of his never very sound body is a fatty degeneration of the heart, which ended the lives of his father, his elder brother, and a long line of their ancestors for a number of generations. The machine stops short and the man drops dead unaware of his death. Instead of telling him to get his weight down, walk slowly upstairs, and avoid needless excitement, the excellent but perhaps overworked professional doctors gave alarming instructions to his heirs to prepare to take over at any time—Heaven knows why, for, in view of these facts, the writer has never bothered about death except in so far as it meant keeping his accounts and testamentary arrangements up to date. His sons, who understood him better than these professional gentlemen, very naturally and properly consulted him, but, not realising the amazing limitations of medical professionalism, they did so far accept the doctors' warning that he could not last for another year. For a time his only doctor was that brilliant diabetic specialist, Robin Lawrence, who dealt with him as a diabetic. An inherent indisposition to hazard opinions outside his province combined with professional usage to

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seal his lips upon the question of the writer's general prospects.

'42 to '44 therefore was flung together in needless haste, and now it is being disarticulated again and what is useful in it distributed. The writer undertook that it should never be cheaper than the huge price he set upon it, and he will now go further and promise that he will do his utmost to prevent its being reprinted at any price whatever. Thereby he hopes that strange indiscriminate creature, the rare book collector, will get his money's worth. . . .

The writer apologises for this lengthy introduction.

He will get this compact book printed as soon as possible and see that it is issued at a price that will bring it within the reach of everybody who wants to read it. It may be difficult, in view of the determined fight of our reactionaries against all lucid ideas, to secure enough paper for a very abundant first edition. He will do his best. He is retaining the copyright to protect the book from mutilation and misquotation, but he will do nothing to deter anyone who cites it fully, fairly and to any extent, from doing so. This general permission can always be verified by writing to him for confirmation.

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I

The End Closes in upon Mind

The writer finds very considerable reason for believing that, within a period to be estimated by weeks and months rather than by æons, there has been a fundamental change in the conditions under which life, not simply human life but all self-conscious existence, has been going on since its beginning. This is a very startling persuasion to find establishing itself in one's mind, and he puts forward his conclusions in the certainty that they will be entirely unacceptable to the ordinary rational man.

If his thinking has been sound, then this world is at the end of its tether. The end of everything we call life is close at hand and cannot be evaded. He is telling you the conclusions to which reality has driven his own mind, and he thinks you may be interested enough to consider them, but he is not attempting to impose them upon you. He will do his best to indicate why he has succumbed to so stupendous a proposition. His exposition will have to be done bit by bit, and it demands close reading. He is not attempting to win acquiescence in what he has to say. He writes under the urgency of a scientific training, which obliged him to clarify

his mind and his world to the utmost limit of his capacity.

That book, '42 to '44, now seems to him merely incidental matter. It is like the remembered shouts of angry people in a train that has passed and gone for ever. His renascent intelligence finds now that we are confronted with strange convincing realities so overwhelming that, were he indeed one of those logical consistent creatures we incline to claim we are, he would think day and night in a passion of concentration, dismay and mental struggle upon the ultimate disaster that confronts our species.

We are nothing of that sort. Whatever dismaying realities our limited reasoning unfolds before us, our normal life is happily one of personal ambitions, affections, generosity, a mixture in nearly every individual of the narrowest prejudices, hates, competitiveness and jealousies with impulses of the most unselfish and endearing quality, bright friendliness, unasked helpfulness; and this, the everyday foreground of our thoughts, will always be sufficiently vivid to outshine any sustained intellectual persuasion of accumulating specific disaster. We live in reference to past experience and not to future events, however inevitable.

It requires an immense and concentrated effort of realisation, demanding constant reminders and refreshment, on the part of a normal intelligence, to perceive that the cosmic movement of events is increasingly adverse to the mental make-up of our

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everyday life. It is a realisation the writer finds extremely difficult to sustain. But while he holds it, the significance of Mind fades. The secular process loses its accustomed appearance of a mental order.

The word "secular" he uses here in the sense of the phrase "*in sæcula sæculorum*", that is to say, Eternity. He has come to believe that that congruence with mind, which man has attributed to the secular process, is not really there at all. The secular process, as he now sees it, is entirely at one with such non-mental rhythms as the accumulation of crystalline matter in a mineral vein or with the flight of a shower of meteors. The two processes have run parallel for what we call Eternity, and now abruptly they swing off at a tangent from one another—just as a comet at its perihelion hangs portentous in the heavens for a season and then rushes away for ages or for ever. Man's mind accepted the secular process as rational and it could not do otherwise, because he was evolved as part and parcel of it.

Much of this, by the by, the writer has set out in a little book with the grandiose title, *The Conquest of Time*, which Messrs. C. A. Watts and Co. published for him in 1942. Such conquering as that book admits is done by Time rather than Man. *Tempus edax rerum*.

"Time like an ever rolling stream bears all its
sons away,

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They fly forgotten as a dream dies at the opening day."

But hitherto other sons have appeared, and now only does life pass plainly into a phase of complete finality, so that one can apprehend and anticipate its end.

The reality glares coldly and harshly upon any of those who can wrench their minds from the comforting delusions of normality to face the unsparing question that has overwhelmed the writer. They discover a frightful queerness has come into life. Even quite unobservant people now are betraying, by fits and starts, a certain wonder, a shrinking and fugitive sense that something is happening so that life will never be *quite* the same again.

Foremost in this scrutiny is the abrupt revelation of a hitherto unsuspected upward limit to quantitative material adjustability. Spread out and examine the pattern of events, and you will find yourself face to face with a new scheme of being, hitherto unimaginable by the human mind. This new cold glare mocks and dazzles the human intelligence, and yet, such is the obstinate vitality of the philosophical urge in minds of that insatiable quality, that they can still, under its cold urgency, seek some way out or round or through the impasse.

The writer is convinced that there is no way out or round or through the impasse. It is the end.

The habitual interest in his life is critical anticipa-

tion. Of everything he asks: "To what will this lead?" And it was natural for him to assume that there was a limit set to change, that new things and events would appear, but that they would appear consistently, preserving the natural sequence of life. So that in the present vast confusion of our world, there was always the assumption of an ultimate restoration of rationality, an adaptation and a resumption. It was merely a question, the fascinating question, of what forms the new rational phase would assume, what Over-man, Erewhon or what not, would break through the transitory clouds and turmoil. To this, the writer set his mind.

He did his utmost to pursue the trends, that upward spiral, towards their convergence in a new phase in the story of life, and the more he weighed the realities before him the less was he able to detect any convergence whatever. Changes had ceased to be systematic, and the further he estimated the course they were taking, the greater their divergence. Hitherto events had been held together by a certain logical consistency, as the heavenly bodies as we know them have been held together by the pull, the golden cord, of Gravitation. Now it is as if that cord had vanished and everything was driving anyhow to anywhere at a steadily increasing velocity.

The limit to the orderly secular development of life had seemed to be a definitely fixed one, so that it was possible to sketch out the pattern of things to come. But that limit was reached and passed into

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a hitherto incredible chaos. The more he scrutinised the realities around us, the more difficult it became to sketch out any Pattern of Things to Come. Distance had been abolished, events had become practically simultaneous throughout the planet, life had to adapt itself to that or perish, and with the presentation of that ultimatum, the Pattern of Things to Come faded away.

Events now follow one another in an entirely untrustworthy sequence. No one knows what to-morrow will bring forth, but no one but a modern scientific philosopher can accept this untrustworthiness fully. Even in his case it plays no part in his everyday behaviour. There he is entirely at one with the normal multitude. The only difference is that he carries about with him this hard harsh conviction of the near conclusive end of all life. That conviction provides no material at all for daily living. It does not prevent his having his everyday affections and interests, indignations and so forth. He is framed of a clay that likes life, that is quite prepared to risk it rather than give way to the antagonistic forces that would break it down to suicide. He was begotten by the will to live, and he will die fighting for life.

He echoes Henley:

“Out of the night that covers me
Black as the Pit from pole to pole,
I thank whatever gods may be

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For my unconquerable soul. . . .
Beyond this place of wrath and tears
Looms but the Horror of the shade,
And yet the menace of the years
Finds, and shall find, me unafraid."

There, for all his philosophical lucidity, in his invincible sticking to life and his will to live, he parallels the normal multitude, which will carry on in this ever contracting NOW of our daily lives—quite unawake to what it is that is making so much of our existence distressful and evasive and intensifying our need for mutual comfort and redeeming acts of kindness. He knows, but the multitude is not disposed to know and so it will never know.

The philosophical mind is not what people would call a healthy buoyant mind. That "healthy mind" takes life as it finds it and troubles no more about that. None of us start life as philosophers. We become philosophers sooner or later, or we die before we become philosophical. The realisation of limitation and frustration is the beginning of the bitter wisdom of philosophy, and of this, that "healthy mind", by its innate gift for incoherence and piecemeal evasion and credulity, never knows. It takes a priest's assurance, the confident assertion of a leader, a misapplied text—the Bible, bless it! will say any old thing one wants it to say if only one picks out what one needs, or, better, if one lets one's religious comforters pick out the suitable

passages—so that one never sees it as a whole. In that invincible ignorance of the dull mass lies its immunity to all the obstinate questioning of the disgruntled mind.

It need never know. The behaviour of the shoal in which it lives and moves and has its being will still for a brief season supply the wonted material for that appreciative, exulting, tragic, pitiful or derisive comment which constitutes art and literature. Mind may be near the end of its tether, and yet that everyday drama will go on because it is the normal make-up of life and there is nothing else to replace it.

To a watcher in some remote entirely alien cosmos, if we may assume that impossibility, it might well seem that extinction is coming to man like a brutal thunderclap of *Halt!*

It never comes like a thunderclap. That *Halt!* comes to this one to-day and that one next week. To the remnant, there is always, "What next?" We may be spinning more and more swiftly into the vortex of extinction, but we do not apprehend as much. To those of us who do not die there is always a to-morrow in this world of ours, which, however it changes, we are accustomed to accept as Normal Being.

A harsh queerness is coming over things and rushes past what we have hitherto been wont to consider the definite limits of hard fact. Hard fact runs away from analysis and does not return.

Unheard-of strangeness in the quantitative proportions of bulk and substance is already apparent to modern philosophical scrutiny. The limit of size and space shrinks and continues to shrink inexorably. The swift diurnal return of that unrelenting pendulum, the new standard of reference, brings it home to our minds that hard fact is outpacing any standard hitherto accepted.

We pass into the harsh glare of hitherto incredible novelty. It beats the searching imagination. The more it strives the less it grasps. The more strenuous the analysis, the more inescapable the sense of mental defeat. The cinema sheet stares us in the face. That sheet is the actual fabric of Being. Our loves, our hates, our wars and battles, are no more than a phantasmagoria dancing on that fabric, themselves as unsubstantial as a dream. We may rage in our dreaming. We may wake up storming with indignation, furious with this or that ineffectual irremovable general, diplomatist, war minister or ruthless exploiter of our fellow men, and we may denounce and indict as righteous anger dictates. '42 to '44 was made up of that kind of outbreak. But there are thousands of mean, perverted, malicious, heedless and cruel individuals coming into the daylight every day, resolute to frustrate the kindlier purposes of man. In *Crux Ansata* again, this present writer has let himself boil over, freely and violently. Nevertheless it is dream stuff.

"To-morrow, and to-morrow, and to-morrow,

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creeps in this petty pace from day to day. . . . and all our yesterdays have lighted fools the way to dusty death. . . . Life . . . struts and frets his hour upon the stage and then is heard no more . . . a tale told by an idiot, full of sound and fury, signifying nothing. . . .”

It passes, and presently it is vague, indistinct, distorted and at last forgotten for ever.

We discover life in the beginnings of our idiot's recital as an urge to exist so powerful that every form it takes tends to increase in size and numbers and outgrow its supply of food energy. Groups or aggregates or individuals increase not only in numbers but in size. There is an internecine struggle for existence. The bigger aggregations or individuals eliminate the smaller and consume more and more. The distinctive pabulum of the type runs short, and new forms, capable of utilising material which the more primitive were not equipped to assimilate, arises.

This inaugurates a fresh phase in the evolving story of Being. This idiot's tale is not a tale of yesterday, as we, brief incidents in the story of life, are accustomed to think of yesterday. It comprehends the whole three thousand million years of Organic Evolution. All through we have the same spectacle of beings over-running their means of subsistence and thrusting their fellows out of the normal way of life into strange habitats they would never have tolerated but for that urge

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to live, anyhow and at any price, rather than die.

For long periods, in our time-space system, a sort of balance of life between various species has existed, and their needless mutations have been eliminated. In the case, however, of a conspicuous number of dominating species and genera, their hypertrophy has led not only to an excess of growth over nutriment, but also in the case of those less archaic forms with which we are more familiar, to a loss of adaptability through the relative importance of bigness over variation. The more they dominated the more they kept on being the same thing.

The continual fluctuations of normal Being in time, and its incessant mutations, confronted each of these precarious hypertrophied unstable dominating groups with the alternative of either adaptive extension of their range or else replacement by groups and species better fitted to the changing face of existence. Astronomical and internal planetary shrinkages in this universe of ours (which are all a part of the Time process) have, for example, produced recurrent phases of world-wide wet mud and given away again to the withdrawal of great volumes of water from a desiccated world of tundras and steppes, through the extension of glaciation. The sun is a variable star, but we can fix no exact term to its variations. The precession of the equinoxes is a wobble in the sequence of our seasons.

The same increasing discordance with the universe

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which we regard as real being, grows more and more manifest. Adapt or perish has been the inexorable law of life through all these ever intensifying fluctuations, and it becomes more and more derisive as the divergence widens between what our fathers were wont to call the Order of Nature and this new harsh implacable hostility to our universe, our *all*.

Our universe is the utmost compass of our minds. It is a closed system that returns into itself. It is a closed space-time continuum which ends with the same urge to exist with which it began, now that the unknown power that evoked it has at last turned against it. "Power", the writer has written, because it is difficult to express this unknowable that has, so to speak, set its face against us. But we cannot deny this menace of the darkness.

"Power" is unsatisfactory. We need to express something entirely outside our "universe", and "Power" suggests something *within* that universe and fighting against us. The present writer has experimented with a number of words and phrases and rejected each in turn. "x" is attractive until one reflects that this implies an equation capable of solution in terms of finite being. "Cosmic process", "the Beyond", "the Unknown", "the Unknowable", all carry unsound implications. "The Antagonism" by itself overstates the idea of positive enmity. But if we fall back on the structure of the Greek tragic drama and think of life as the Protagonist

trailing with it the presence of an indifferent chorus and the possibility of fluctuations in its role, we get something to meet our need. "The Antagonist", then, in that qualified sense, is the term the present writer will employ to express the unknown implacable which has endured life for so long by our reckoning and has now turned against it so implacably to wipe it out.

As our minds have probed more and more curiously into the space-time continuum in which the drama of evolution has been framed, they have discovered one paradoxical aspect after another behind the plausible face of "normal" Being. The uranium-lead riddle, to which we shall recur, is only among the latest of these absurd posers.

For example we have realised quite recently there is a limit set to velocity. The highest speed at which anything can move is the velocity of light. It is an ingenious suggestion to compare our normal world to a three-dimensional system falling along a fourth dimension at that speed. But this fourth dimension through which it falls implies a residuum of the space-time continuum in which our "universe" is framed. All that space-time continuum is our "universe". It leaves us still with its evolutionary process and all the rest of it within the confines of our system.

The searching scepticism of the writer's philosophical analysis has established this Antagonist as invincible reality for him, but, all over the earth

and from dates immemorial, introspective minds, minds of the quality of the brooding Shakespeare, have conceived a disgust of the stresses, vexations and petty indignities of life and taken refuge from its apprehension of a conclusive end to things, in mystical withdrawal. On the whole mankind has shown itself tolerant, sympathetic and respectful to such retreats. That is the peculiar human element in this matter; the recurrent refusal to be satisfied with the normal real world. The question "Is this all?" has troubled countless unsatisfied minds throughout the ages, and, at the end of our tether, as it seems, here it is, still baffling but persistent.

To such discomfited minds the world of our everyday reality is no more than a more or less entertaining or distressful story thrown upon a cinema screen. The story holds together; it moves them greatly and yet they feel it is faked. The vast majority of the beholders accept all the conventions of the story, are completely part of the story, and live and suffer and rejoice and die in it and with it. But the sceptical mind says stoutly, "This is delusion".

"Golden lads and lasses must, like chimney sweepers, come to dust."

"No," says this ingrained streak of protest: "there is still something beyond the dust."

But *is* there?

There is no reason for saying there is. That sceptical mind may have overrated the thoroughness

of its scepticism. As we are now discovering, there was still scope for doubting.

The severer, our thinking, the plainer it is that the dust-carts of Time trundle that dust off to the incinerator and there make an end to it.

Hitherto, recurrence has seemed a primary law of life. Night has followed day and day night. But in this strange new phase of existence into which our universe is passing, it becomes evident that *events no longer recur*. They go on and on to an impenetrable mystery, into a voiceless limitless darkness, against which this obstinate urgency of our dissatisfied minds may struggle, but will struggle only until it is altogether overcome.

Our world of self-delusion will admit none of that. It will perish amidst its evasions and fatuities. It is like a convoy lost in darkness on an unknown rocky coast, with quarrelling pirates in the chart-room and savages clambering up the sides of the ships to plunder and do evil as the whim may take them. That is the rough outline of the more and more jumbled movie on the screen before us. Mind near exhaustion still makes its final futile movement towards that "way out or round or through the impasse".

That is the utmost now that mind can do. And this, its last expiring thrust, is to demonstrate that the door closes upon us for evermore.

There is no way out or round or through.

II

Mind is Retrospective to the End

The writer has already made the distinction between his very intermittent and specialised phases as a philosophical enquirer and the normal interests of his life. There he is just another ant, albeit sustained in his stoical acceptance by a rare and peculiar vision. But the masses of our fellow-creatures have not that vision to sustain them, and we have to square our everyday conduct to theirs.

There are large ambiguous masses of the formicary, whose leaders, unable to grasp what is happening, are resorting to the most evil and malignant magic propitiations to avert the distressful fate that closes in upon us all. Denunciation, which implements old prejudices with a new cruelty, flourishes. The unfortunate ant involved in these milling masses does his best to keep his faith to those to whom he has given himself over. So he may get away with it to the end. He may feel uncomfortable and disconcerted at times, but he and his associates will for the most part sustain an atmosphere of valiant futility, assuring themselves and one another that presently the old game will

be resumed with all its present stresses gone like a dream. And even before he is sufficiently awake to tell his dream of his world restored, he will have forgotten it and passed into nothingness for ever.

III

There is no "Pattern of Things to Come"

Our universe is not merely bankrupt; there remains no dividend at all; it has not simply liquidated; it is going clean out of existence, leaving not a wrack behind. The attempt to trace a pattern of any sort is absolutely futile.

This is acceptable to the philosophical mind when it is at its most philosophical, but for those who lack that steadying mental backbone, the vistas such ideas open are so uncongenial and so alarming, that they can do nothing but hate, repudiate, scoff at and persecute those who express them, and betake themselves to the comfort and control of such refuges of faith and reassurance as the subservient fear-haunted mind has contrived for itself and others throughout the ages.

Our doomed formicary is helpless as the implacable Antagonist kicks or tramples our world to pieces. Endure it or evade it; the end will be

the same, but the evasion systems involve unhelpfulness at the least and in most cases blind obedience to egotistical leaders, fanatical persecutions, panics, hysterical violence and cruelty.

After all the present writer has no compelling argument to convince the reader that he should not be cruel or mean or cowardly. Such things are also in his own make-up in a large measure, but none the less he hates and fights against them with all his strength. He would rather our species ended its story in dignity, kindness and generosity, and not like drunken cowards in a daze or poisoned rats in a sack. But this is a matter of individual predilection for everyone to decide for himself.

IV

Recent Realisations of the Nature of Life

A series of events has forced upon the intelligent observer the realisation that the human story has already come to an end and that *Homo sapiens*, as he has been pleased to call himself, is in his present form played out. The stars in their courses have turned against him and he has to give place to some other animal better adapted to face the fate that closes in more and more swiftly upon mankind.

That new animal may be an entirely alien strain, or it may arise as a new modification of the *hominidae*, and even as a direct continuation of the human phylum, but it will certainly not be human. There is no way out for Man but steeply up or steeply down. Adapt or perish, now as ever, is Nature's inexorable imperative.

To many of us this crude alternative of up or down is intensely unpalatable. The forces that evolved us in the long succession of living beings endowed us with a tenacity of self-assertion that rebels against the bare idea of giving place to rats or unclean intrusive monsters equipped with streptococci for our undoing. We want to be in at the death of Man and to have a voice in his final replacement by the next Lord of Creation, even if, *Œdipus*-like, that successor's first act be parricide.

All over this planet are scattered the traces and achievements of Man, and it demands an intense intellectual effort from most of us to realise that this wide distribution of human products, is a matter of the past hundred thousand years. Radio-active substances and the process of radio disintegration must have begun in the solar system in a period of about three thousand million years and had *already ceased* long before life had become possible upon earth. Says Dr. N. H. Feather of the Cavendish Laboratory, Cambridge, in *Chemical Products*, Vol. 7, No. 11-12, Sept.-Oct. 1944:

"All radioactive species are 'natural' in the sense

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that conditions must have obtained at some stage in cosmic evolution, and probably still obtain in the interiors of the hotter stars, in which their production has taken place—and is still possible, but those conditions have not obtained on the earth since the time of its separation from the sun, and, as inhabitants of the earth, we conventionally regard as 'natural' only those radio elements which are found on our planet to have survived the period of some three thousand million years (3×10^9 years) since separation occurred."

Thereafter by degrees the planet became a possible habitat for this strange intruder, *life*. It span about the sun at what rate we do not know, nor at what distance, it acquired a satellite moon whose rotation was slowed down by a tidal wave until it turned its face towards its mother earth for ever. So a lunar month is a lunar day. Our own planet must be undergoing a similar retardation towards the sun, so that early years and ages of life on earth rushed by at a pace out of all proportion to these last deliberate ages. The machine was running with feebler brakes. Somewhen in that headlong phase, under shelter of a dense cloud canopy of steam, the series of rhythms we call life, began.

In the invariable darkness of the deep sea, in the implacable dryness of the dry land, there were no rhythmic possibilities. It was, as Professor J. B. S. Haldane, in one of his admirable popular articles,

has pointed out, in the intertidal belt only that they were to be found. Light followed darkness and darkness light, and life, that peculiar throb in matter, ensued. The palæontologist finds intimations in the record of the rocks, of a lifeless phase of unknown duration; before the sunlight actually pierced the steamy veil and inaugurated the process called life.

The sequences of these opening rhythms are still indeterminate. They were elemental, so that their nearest analogies are to be found in the microscopic tissue elements of contemporary life or in the surface waters of the sea. There was a huge proliferation of diatoms and the like, and very early in the story some favourable mutation produced a green substance, chlorophyll, which, in the presence of sunlight, produced a quasi-permanent, infectious compound so long as the light endured. So that the record of the rocks breaks abruptly from lifelessness into a variety of intertidal forms.

These forms in all their variety manifest one disposition in common, an *élan vital*, a drive to assert their being. They display in its crude beginnings that "struggle for existence" which has become the fundamental theme of the history of life. Quite early this living stuff breaks up into individual fragments, which can meet varying occasions and survive here even if others dry up or otherwise perish there. These primitive individuals seem free from any impulse of conflict either against the food they

ingest or against one another. If they meet they will flow together and break up again apparently invigorated by the encounter. This rejuvenescence occurs without any sexual differentiation. It is an affair between equals.

But the establishment of a difference among individuals so that one set is specialised for adventure, experiment and ultimate death while another sort continued the species without ending, began very early in the history of life. The great majority of the many-celled beings upon this planet begin and end as fertilised ova. Some bud and break up; some are propagated by cuttings, by parthenogenesis (as with green fly) or the like, but such methods of reproduction keep the species fixed, inadaptably and vulnerable, and sooner or later, if there is to be survival, there must be a return for invigoration and variation to the male and female roles already established in their present form in the earliest chapters of the palæontological record.

There are wide fluctuations in the differentiation of the sexes even in the same species, according to the changing imperatives of life. Few of us stay to consider the sex of a tiger or tigress when we encounter it at large, but the sex of a passing cat or of a rabbit or hedgehog, or of a wolf in a pursuing pack or a fly or a lizard, is by no means obvious.

Even the stigmata of sex in *Homo sapiens* are far less conspicuous to-day than they were a hundred years ago. The exaggeration of the waist by tight-

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lacing has ceased. So also has much mysterious cossetting of girls. The bicycle played a part in that release. The growing girl braced herself up and went for a gentle ride on the new toy when her grandmother would have been resting in bed, and found herself all the better for it. At any crisis our great-grandmothers would "swoon", but who ever hears of women swooning to-day? Now men faint more frequently than women.

In a brief period, within the lifetime of an elderly man, the relations of the sexes in the British community, the age relations in marriage, the social readjustments consequent upon these changes, have been greatly changed. Older men used to marry and use up young wives; now the world is full of young couples and it is exceptional to meet wintry January married to blooming May. The pendulum may swing back. Or it may not be a pendulum swing we are contemplating. Deliberately planned legislation, food shortages and suchlike economic processes, waves of sentiment for or against maternity, patriotic feeling or the want of it, the natural disposition to fall in love coupled with a desire to fix a relationship by some permanent common interest, and a pride in physically and mentally well-begotten children, may play incalculable parts in the production of a new humanity, capable of an adaptation to the whirling imperatives about us, sufficient to see out the story of life on earth to its end.

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It is claimed by various religious bodies that they protect "the institution of the family". They do nothing of the sort. The family has existed since animals bred and mated and went apart to protect and rear their young. But priestly intervention has degraded this clean and simple relationship by damning unborn children with the idea that they were "conceived in sin", making illegitimacy mysteriously shameful, and keeping all the fundamental facts and possibilities of family life from young people until it is too late for them to benefit by their knowledge.

V

Race Suicide by Gigantism

The human individual lives to a very great age, measured by the lives of the creatures about him. The Radium Clock gives us a maximum period of far less than ten and probably far less than five thousand million terrestrial years for the career of life. During all this period there has been a constant succession of forms, dominating the scene. Each has dominated, and each in its turn has been thrust aside and superseded by some form better adapted to the changing circumstances of life. Each has

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obeyed certain inescapable laws that seemed to be in the very nature of things.

First of these laws was the imperative to aggression. The fiat was live, and live as abundantly as possible. Live more than your brothers, grow larger, devour more. In the earlier days this imperative was unqualified by any impulse to mutual aid against a common competitor. So the big individuals ate up the food of the small ones, even if they did not actually eat them, and grew larger and larger. In the record of the rocks it is always the gigantic individuals who appear at the end of each chapter.

The planet spins, climate changes, so that the old overgrown Lord of Creation is no longer in harmony with his surroundings. Go he must. Usually but not always, some entirely different form of life succeeds him. Or like the sharks he may dwindle in numbers until the food supply overtakes him, and then, if nature has contrived no alternative in the meanwhile, he may return to his former abundance. Sharks and their kind live and die violently and nothing is left of them to fossilise. We know of huge contemporary basking sharks and the like. They may have grown to their present bigness quite recently or they may have basked for ages—as soon as there were sufficient fishes to be devoured. We are left guessing.

VI

Precocious Maturity, a Method of Survival

Nature in her insensate play with the possibilities of life has produced some abrupt novelties in the record by accelerating the fertilisation and ripening of the ovum relatively to the other phases of the life cycle. We must bear in mind always in these questions that it is a complete life cycle we inherit and not some fixed adult form. And time after time Nature has cut out an adult form from the record altogether, abolished it, and made some larval stage the sexually mature form.

At one early phase in the record, the Echinoderms, the starfish and so forth, with their radiant structure, were Lords of Creation. They had little or no powers of locomotion in their adult state, and many, like the crinoids, were rooted to the rocks. Among other radiant forms the Tunicata had reverted to the production of cellulose and were markedly vegetative in their habit of life. They discharged their fertilised eggs into the water and dissemination of these was greatly assisted by the development of accessory structures that stiffened the drifting larvæ and gave an independent impetus to their movement. The backbone of these

travelling emissions has been christened the notochord, and the new fore and aft forms of life of which it was the precursor, are called the Chordata, as opposed to the series of forms without notochords, the Starfish, Sea Urchins, Sea Cucumbers and so on, which had hitherto been Lords of Creation. The whole vast world of backboned animals, including ourselves, owes its existence to this freak of nature. There was no reason whatever in it. It happened so.

The notochord appears in the development of all vertebrated animals, but in all the higher forms it is invaded and superseded by cartilaginous or bony matter. It persists through life in the hag-fish and lampreys, and in the lamprey it comes to our tables.

VII

The Antagonism of Age and Youth

The writer accepts these facts of nature with tranquillity and would not have them otherwise. But he does not believe that any young man, younger than thirty-five, let us say, as a maximum, will accept them in the same spirit. Until round and about that age every younger man is in conflict with the universe

and seeks to have his will of it. He must be a very under-vitalised being indeed to be ready to give in and "take things as they are".

But the present writer is in his seventy-ninth year; he has lived cheerfully and abundantly. Like Landor he has warmed both hands at the fire of life and now as it sinks towards a meticulous invalidism, he is ready to depart. He awaits his end, watching mankind, still keen to find a helpful use for his accumulations of experience in this time of mental confusion, but without that headlong stress to come to conclusions with life, which is a necessary part of the make-up of any normal youngster, male or female.

Every man of over the formative years is in the same case as the writer. He made himself then. Since then he and all those other elder men have simply been working out and elaborating, with, in most cases, a certain ebb of intensity, the forms of thought into which they shaped their convictions. He is inclined to think that his continuing interest in biological science may have kept him in closer touch with living realities than is the case with politicians or money speculators or divines or busy business men, but that does nothing to bridge the gulf between an older man and the young. Hopefully or maliciously, jealously or generously, we old boys look on and cannot be anything better than lookers-on. We lived essentially, forty years odd ago. The young are *life*, and there is no hope but in them.

VIII

New Light on the Record of the Rocks

The rotation of the earth and its annual circulation in its orbit is slowing down. All that has come to light in recent years stresses this idea that, measured by the precisions of the Radium Clock, our estimate of the duration of the early ages of the record of the rocks must undergo a quite immense reduction relative to the Cainozoic period. The shapes remain the same but the proportions are different. That secular slowing down may or may not have been continuous. That it was seems the more probable thing to the writer. We do not know. The conditions of individual and specific survival seem to have fluctuated very rapidly and widely in those headlong times.

One thing is certain. Not one fact has ever emerged, in a stupendous accumulation of facts, to throw a shadow of doubt upon what is still called the "Theory" of organic evolution. In spite of the vehement denials of the pious, no rational mind can question the invincible nature of the evolutionary case. There is an admirable little book by A. M. Davies, *Evolution and Its Modern Critics*, in which this case is fully and convincingly

summarised. To that the ill-informed reader should go.

What does appear now, is this fact of the slowing down of terrestrial vitality. The year, the days, grow longer; the human mind is active still but it pursues and contrives endings and death.

The writer sees the world as a jaded world devoid of recuperative power. In the past he has liked to think that Man could pull out of his entanglements and start a new creative phase of human living. In the face of our universal inadequacy, that optimism has given place to a stoical cynicism. The old men behave for the most part meanly and disgustingly, and the young are spasmodic, foolish and all too easily misled. Man must go steeply up or down and the odds seem to be all in favour of his going down and out. If he goes up, then so great is the adaptation demanded of him that he must cease to be a man. Ordinary man is at the end of his tether. Only a small, highly adaptable minority of the species can possibly survive. The rest will not trouble about it, finding such opiates and consolations as they have a mind for. Let us then conclude this speculation about the final phase in the history of life, by surveying the modifications of the human type that are in progress to-day.

The Primates appeared as forest creatures related to groups of the Insectivora. They commenced arboreal. They acquired quickness of eye and muscular adjustment among the branches. They

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were sociable and flourished widely. Then, as the usual increase in size, weight and strength occurred, they descended perforce to ground level, big enough now to outface, fight and outwit the larger carnivores of the forest world. Their semi-erect attitude enabled them to rear up and beat at their antagonists with sticks and stones, an unheard-of enhancement of tooth and claw. But presently their sociability diminished because they now needed wide areas of food supply. The little fellows faded out before the big fellows, according to the time-honoured pattern of life. The great apes developed the institution of the private family to a high level. Along this line they travelled to the gorilla, the chimpanzee, the orang-utan of to-day.

But outside forest regions during a phase of forest recession, the developing primates were exposed to other exactions. Grass plains and arid steppes spread out. The supply of vegetable food shrank. Small game and meat generally became an increasingly important part of the dietary. As ever there was the alternative: "Adapt or perish." From a world-wide massacre of resistant primates a new series of forms had the good fortune to escape. They were more erect than the forest apes; they ran and hunted and they were sufficiently intelligent to co-operate in their hunting.

These cursive ground apes were the Hominidæ, a hungry and ferocious animal series. Since they are open air animals with sufficient wits to avoid fre-

quent drowning, the fossil traces of their appearance are few and far between. But they suffice. If they did not leave many bones, they littered the world with implements. The erect attitude had liberated hand and eye for a more accurate co-operation. These brutes communicated by uncouth sounds. They seized upon stakes and stones for their purposes. They hammered great stones into a sharper shape, and when the sparks flew into the dry leaves amidst which they squatted and the red flower of fire appeared, it appeared in a manner so mild and familiar to them that they were not dismayed. No other living creature hitherto had seen fire except in a catastrophic stampede of terrified animals. It pursued relentlessly. Bears, even cave bears, bolted headlong from fire and smoke. The Hominidæ on the contrary made a friend and a servant of fire. Attacked by cold or carnivorous enemies, they countered by creeping into caverns and suchlike sheltered places and keeping the home fires burning.

So in the wintry phases of the successive glacial periods, these great quasi-human lout-beasts prevailed. With uncouth cries and gestures they hunted and killed. They were, in their adult form, much bigger and heavier than men. The clumsy hands that battered out the Chellean implements were bigger than any human hand. Skilled knappers can forge the relatively delicate implements of the later palæolithic men with the utmost success, but the sham Chellean implement is as difficult as a

subhuman eolith. The Chellean implement is the core of a great flint; the later human implement is a flake struck off from a core.

The creature called *Homo sapiens* emerges from among the earlier Hominidæ very evidently, as another of those relapses of the life-cycle towards an infantile and biologically more flexible form, which have played so important a role in the chequered history of living things. He is not the equivalent of the clumsy adult Heidelberg or Neanderthal man. He is, in his opening phase, the experimental, playful, teachable, precocious child, still amenable to social subordination when already sexually adult. The ever changing conditions of life had less and less tolerance for a final gross overbearing adult phase, and it was cut out of the cycle. That primordial gross adult *Homo* disappears, and gives place to a more juvenile type, that much the record shows very plainly, but the phases and manner of the transition remain still open to speculation. All varieties of *Homo sapiens* interbreed, and there may have been a continuous interbreeding among the earlier species of the genus. Intervals of isolation may have produced Neanderthaloid, negroid, fair, dark, tall and short local variations still able to interbreed—in the same way that the dogs have produced endless races that can and will mongrelise when barriers break down. Families and tribes may have warred against each other and the victors have obliterated their distinctiveness by mating with

captive women. Comparative anthropology slowly disentangles this story of the way in which the now unnecessary primordial adult *Homo*, for all effective purposes, faded out, leaving as his successor the childlike *Homo sapiens*, who is, at his best, curious, teachable and experimental from the cradle to the grave.

These words "at his best" are the gist of this section. It is possible that there are wide variations in the mental adaptability of contemporary mankind. It is possible that the mass of contemporary mankind may not be as readily accessible to fresh ideas as the younger, more childish minds of earlier generations, and it is also possible that hard imaginative thinking has not increased so as to keep pace with the expansion and complication of human societies and organisations. That is the darkest shadow upon the hopes of mankind.

But my own temperament makes it unavoidable for me to doubt, as I have said, that there will not be that small minority which will succeed in seeing life out to its inevitable end.

